

YINGLI SOLAR PV MODULES

Mounting Guide

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This Mounting Guide applies to photovoltaic modules ("PV modules", also commonly known as solar panels) manufactured by Yingli Green Energy Holding Co., Ltd. ("Yingli Solar") and is explicitly written for qualified professionals ("Installer" or "Installers"), including without limitation licensed electricians and NABCEP-Certified PV Installers. This document is intended to serve as a supplement to the Installation and User Manual for Yingli Solar PV Modules, however all requirements in the Installation and User Manual for Yingli Solar PV Modules also apply. In case of discrepancies, the Installation and User Manual for Yingli Solar PV Modules shall take precedence.

Due to the development and continuous improvement of Yingli Solar PV modules, the guidelines in this Mounting Guide are subject to change without notice. No rights can be derived from the Mounting Guide and Yingli Solar assumes no liability whatsoever connected to or resulting from the use of any information contained herein.

INTRODUCTION

Specific site conditions or applications can make it challenging to safely and effectively mount PV modules using conventional methods. Fortunately, a growing number of hardware vendors and mounting methods are available to the Installer to address these obstacles. The intent of this document is to present and discuss the comprehensive range of approved options for mounting Yingli Solar PV modules, in order to simplify and facilitate the installation process. At the same time, it is also designed to give you clear instructions on how to attach Yingli Solar PV modules to a given mounting structure in order to ensure compliance with the requirements of the Yingli Solar Limited Warranty for PV Modules.

This guideline applies to the following product lines of PV modules manufactured by Yingli Solar:

- YGE 60 Cell Series
- YGE 72 Cell Series (including the YGE-U 72 Cell Series)

For additional information about the specifications of Yingli Solar PV modules and installation requirements, please read the Installation and User Manual for Yingli Solar PV Modules.

Thank you for choosing Yingli Solar as your PV module provider. We appreciate your business!

GENERAL GUIDELINES

Yingli Solar PV modules can be mounted in one of several permissible configurations, which are described in detail throughout this document. Each configuration has a combined wind and snow load for both the positive and negative directions that is maximally allowed by Yingli Solar in order for the Yingli Solar Limited Warranty for PV Modules to remain valid. Maximum design loads must be calculated according to ASCE 7-05: Minimum Design Loads for Buildings and Other Structures and should be approved by a licensed structural engineer.

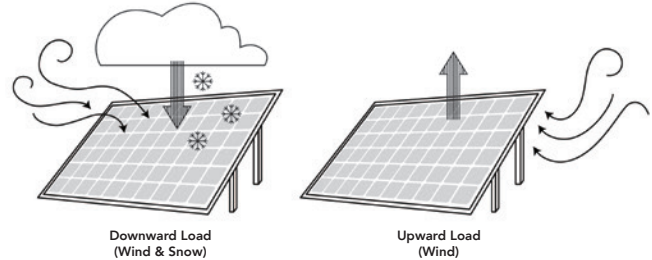


Figure 1: Upward and downward loads

Mounting structures and other mechanical parts must be designed and approved by a certified engineer for mounting PV modules and able to withstand the design wind and snow loads applicable for a particular geographical PV system location.

Unless otherwise specifically stated by Yingli Solar, the installation instructions provided by the mounting structure manufacturer must be strictly adhered to in order for the Yingli Solar Limited Warranty for PV Modules to remain valid. In cases where the mounting structure manufacturer either does not allow a particular configuration which is permissible in accordance with this guide, or does not allow wind or snow loads as high as what is specified by this guide, then the limitations of that manufacturer's installation instructions shall take precedence over these guidelines.

During installation and operation, Yingli Solar PV modules must not be subjected to forces from the mounting surface and substructure, including but not limited to those forces caused by thermal expansion.

Do not modify the existing mounting holes or drill new holes.

Always consult with the local authority having jurisdiction before installation in order to determine if any additional regulations or requirements may apply.

Additionally, if your design load requirement is greater than those shown, please contact your Yingli sales representative for options.

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METHOD A:
BOLTS

When mounting PV modules with bolts, the mounting holes located on the rear flange of the frame must be used. Use either ¼ inch or M6 stainless steel bolts, nuts and washers. The bolts should be torqued to racking/mounting manufacturer's specifications.

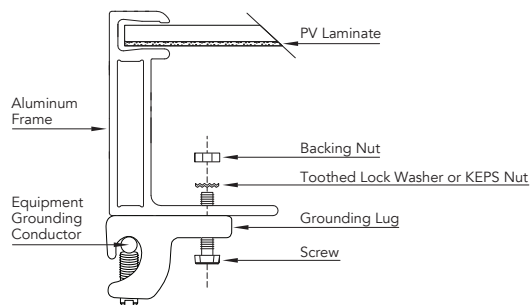


Figure 2: Detail of a bolt mounting attachment

Table 1 includes a list of maximum allowable load pressure for modules that are mounted with bolts through the mounting holes.

Series	Attachment Location	Maximum Load (Pa)
YGE 60 Cell	4 bolts at each of the mounting holes	2400 upward, 2400 downward
YGE 72 Cell	4 bolts at the outer mounting holes	2400 upward, 2400 downward

Table 1: Allowable maximum load pressure for mounting with bolts

METHOD B:
FRAME INSERTION

Module frames can be supported by insertion systems where the module frame rests inside of a channel. The channels are required to support the entire length of either both of the long frames or both of the short frames. Module frames must be restricted from vibrating in the channel.

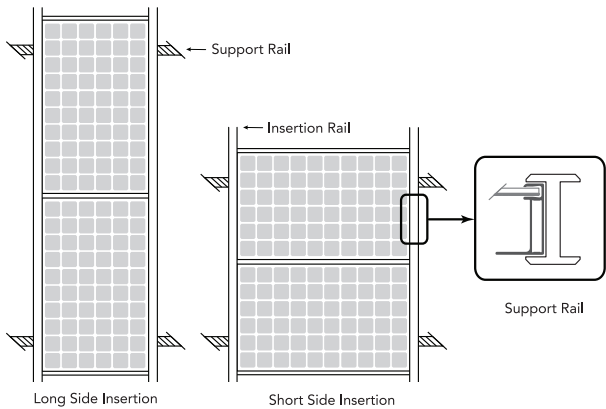


Figure 3: Long side and inside insertion mounting

Series	Attachment Location	Maximum Load (Pa)
YGE 60 Cell	Two channels that support both long frames	2400 upward, 2400 downward
YGE 60 Cell	Two channels that support both short frames	1900 upward, 1900 downward
YGE 72 Cell	Two channels that support both long frames	2400 upward, 2400 downward
YGE 72 Cell	Two channels that support both short frames	1900 upward, 1900 downward

Table 2: Allowable maximum load pressure for insertion mounting

METHOD C:
TOP-DOWN/BOTTOM-UP CLAMPS

PV modules may be mounted with third-party clamps provided they are adequately designed to attach PV modules to a specific substructure for site specific loading conditions. A clamp may attach up to two or more adjacent modules simultaneously.

Clamps must be installed according to the manufacturer’s specified instructions. Do not apply excessive pressure on the frame such that the frame deforms. Refer to the mounting structure manufacturer for specific hardware and torque requirements.

For clamping with four clamps, one clamp must be located in each of the four regions (each region consists of 3 zones) shown in Figure 4. Clamping locations may be distributed in an arbitrary manner as long as there is attachment in each region and the overall clamping geometry has at least one axis of mirror symmetry perpendicular to one module side (see Figure 5). Highest maximum load pressures are approved when the clamps are situated at each of the mounting holes plus or minus 50mm (about 2 inches). Note: if symmetrical mounting is followed but there is clamping in two different zones, the lower maximum load pressure of the two zones shall apply.

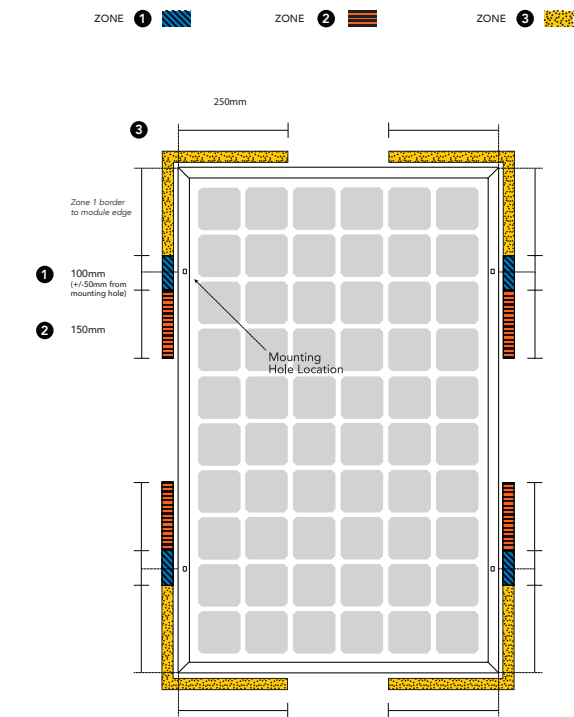


Figure 4: Mounting zones for mounting with clamps

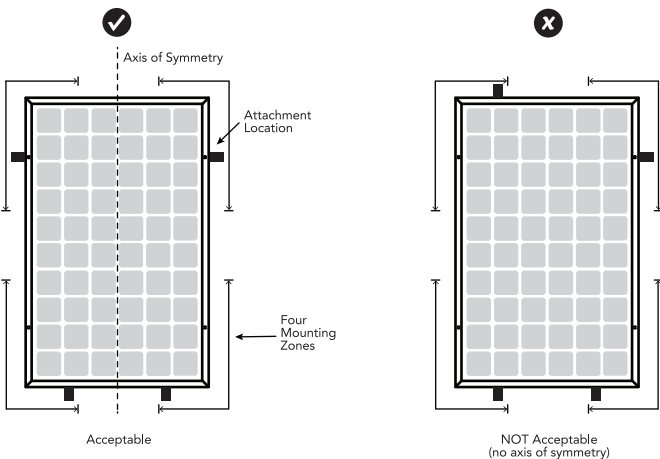


Figure 5: One acceptable and one unacceptable mounting geometry

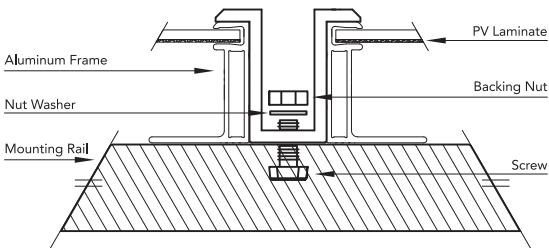


Figure 6: Detail of a center top-down clamp mounting attachment.

Table 3 includes a list of maximum allowable load pressures for clamps at various mounting locations, including at the mounting holes or in alternative mounting regions, as illustrated in Figure 4.

Series	Attachment Location	Maximum Load (Pa)
YGE 60 Cell	4 clamps at standard mounting (Zone 1)	2400 Pa upward, 2400 Pa downward
YGE 60 Cell	4 clamps at inside mounting (Zone 2)	1900 Pa upward, 1900 Pa downward
YGE 60 Cell	4 clamps at corner mounting (Zone 3)	1520 Pa upward, 1520 Pa downward
YGE 72 Cell	4 clamps at standard mounting (Zone 1)	2400 Pa upward, 2400 Pa downward
YGE 72 Cell	4 clamps at inside mounting (Zone 2)	1900 Pa upward, 1900 Pa downward
YGE 72 Cell	4 clamps at corner mounting (Zone 3)	960 Pa upward, 960 Pa downward

Table 3: Allowable maximum load pressure for mounting with clamps

METHOD D:
CLAMPING TO THE FRAME FLANGE
AT THE CORNERS

Attachment of flange clamps, such as the Panelclaw “Claw”, are permitted for Yingli Solar PV modules. The clamp attaches to the flange of the PV module at each of the four corners, on either the two short frame or long frame members. Ensure that the claws are flush with both the long and short lengths of the PV module flange.

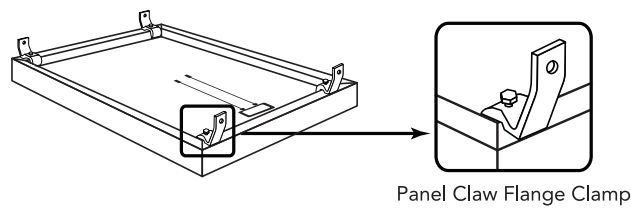


Figure 7: Module with corner flange clamps

Series	Attachment Location	Maximum Load (Pa)
YGE 60 Cell	Flange of frame at four corners	1520 upward, 1520 downward
YGE 72 Cell	Flange of frame at four corners	960 upward, 960 downward

Table 4: Allowable maximum load pressure for corner flange clamps

METHOD E:
CENTER CLAMP

Attachment with center clamps, such as the Array Technologies DuraTrack™ HZ single axis tracker universal clamp, is permitted for Yingli Solar PV modules. For proper attachment, place two PV modules into a clamp so that the center of the module is lined up with the center of the clamp. Ensure that the clamp fully grips both PV module frames.

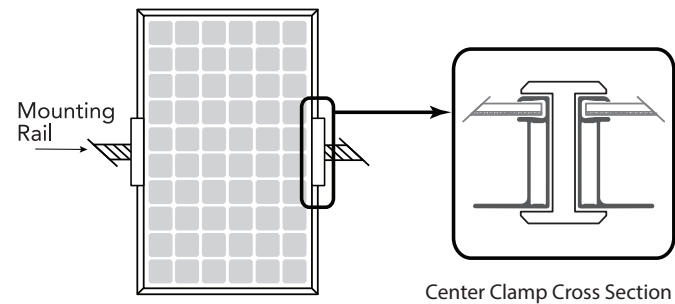


Figure 8: Module with center clamps

Yingli works with major center clamp manufacturers to approve acceptable load pressures on a project-by-project basis. Please contact the clamp manufacturer for details with regards to specific projects.

For questions or more information, please contact:

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